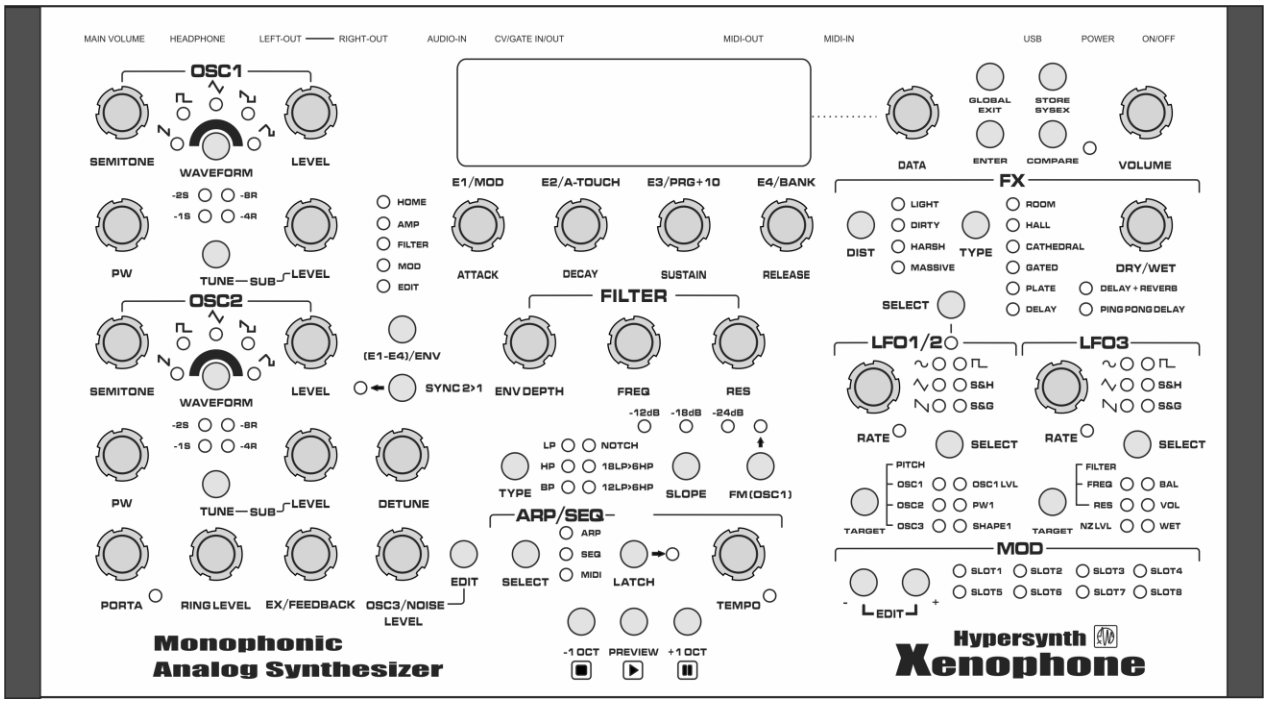
XENOPHONE

Reference Manual



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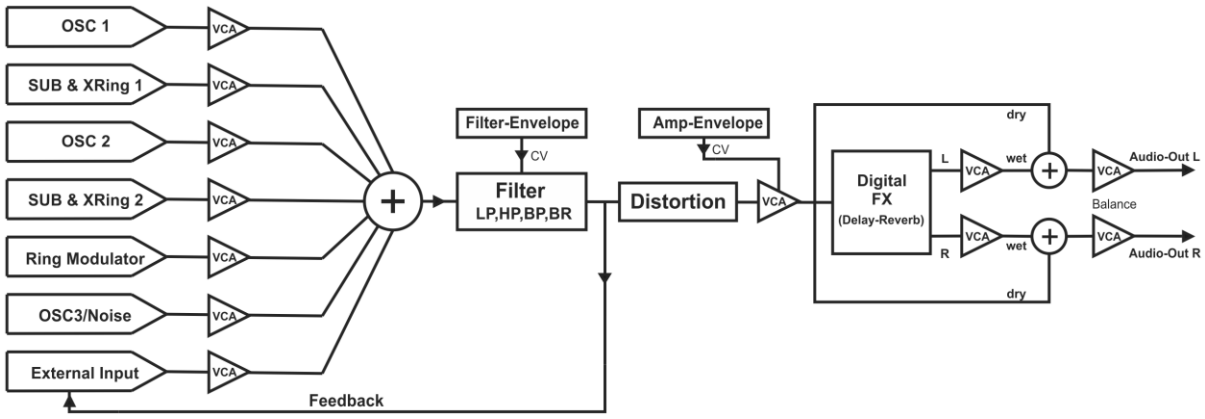
ABOUT THIS MANUAL

This manual assumes that you have some knowledge about subtractive synthesizers, so it does not go into depth of certain concepts such as how Filter, LFO or ENV work in detail, although the unique features are described here briefly. There are plenty of resources for information about the theory of sound synthesis. For more information about Connections, Basic Operation, Global settings, Saving, loading and renaming patches please refer to **Quick Start** guide.

SIGNAL FLOW

Xenophone's signal path is 100% analog. This means that Oscillators, VCAs, Mixer, Filter and Distortion are based on analog circuits and there is no **D/A** (digital to analog converter) in signal path. Except for **Digital FX** which can be muted and leave the analog signal untouced. DFX stereo outputs are injected to a pair of VCAs and then mixed with the master VCA output signal.



SYNTH ENGINE:

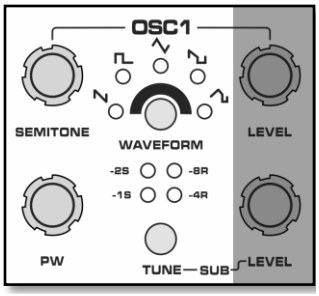
Xenophone is an analog subtractive synth while it follows a modern semi modular architecture. The engine is customized in way to provide the important functions via hardwired connections and at the same time giving you the option to route your own signals via Modulation Matrix. The synth engine consists of 16 parts. Each part has several parameters which can specifically alter the sound shape, pitch, timber and color. These parts are categorized in two groups: **Audio** and **Mod**.

Audio Group: Oscillator1, Oscilaltor2, Noise Generator/Oscillaotor3, Mixer, Filter, Main

Mod Group: Voice, Amplitude Envelope, Filter Envelope, Modulation Envelope, LFO1, LFO2, LFO3, Arpeggiator, Sequencer, Mod Matrix.

Audio group includes parts that are basically the source of the sound or affect the sound shape or color directly. The Audio group parameters are controlled by CVs **"Control Voltages"** that are generated by Mod group. The Mod group parts do not generate any sound but produce control voltages to modulate the Audio group parameters. Mod group can also modulate themselves via Modulation matrix. All these 16 parts are described one by one in the next pages of this manual.

OSCILLATOR 1



Semitone: [-60…+60] sets oscillator base frequency over 10 octaves from C-1 to C9: 8Hz-8Khz (C4 is the middle C)

Cent: [-50…+50] fine tune the base frequency; 0 centered. (50 cents = 1/2 semitone). (Soft Knob E3)

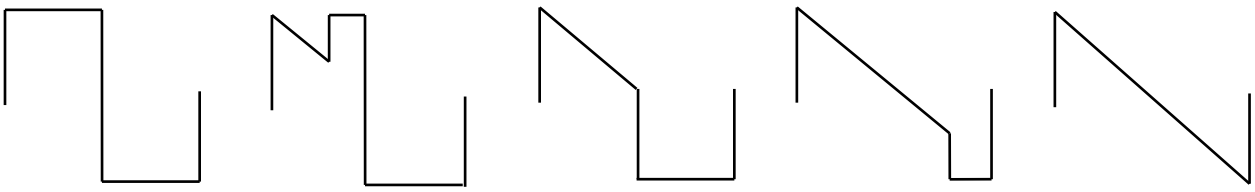
Keytrk: [on, off] enables/disables keyboard tracking for oscillator. For regular playing it must be on. When [off], the oscillator frequency is fixed and does not follow the played keys. (Soft Knob E4)

Waveform: see table:

Waveform	Description
Saw	Sawtooth
Sqr	Square
Tri	Triangle
SawSqr	Combined Saw and Square
TriSqr	Combined Triangle and Square
Off	Disconnects oscillator from the mixer, reduces background noise
StpSqr	Combined Square and Square (Stepped Square)
Xor1-2	Ring Modulation between oscillator 1 and 2 square wave

Saw, Square and Triangle are the classic waveforms. Xenophone oscillators are purely analog and not wavetable based but they can produce new waves out of the classic ones using waveshaper circuit. These new waves are called combined waveforms:

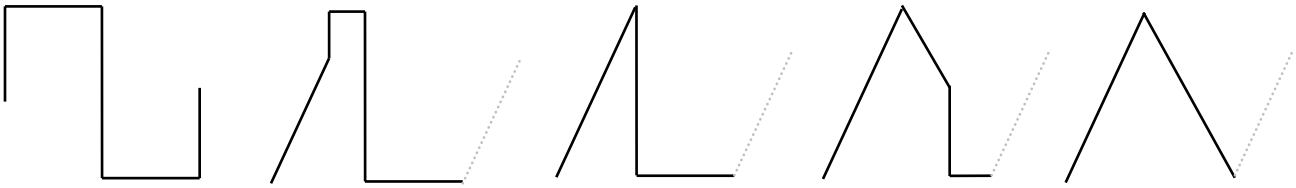
SawSqr is build from **Saw and Square** in time domain (not Amplitude). Using **Shape** parameter you can morph between these two waveforms like the following example:



Shape 0 *Shape 50* *Shape 100* *Shape 150* *Shape 200*

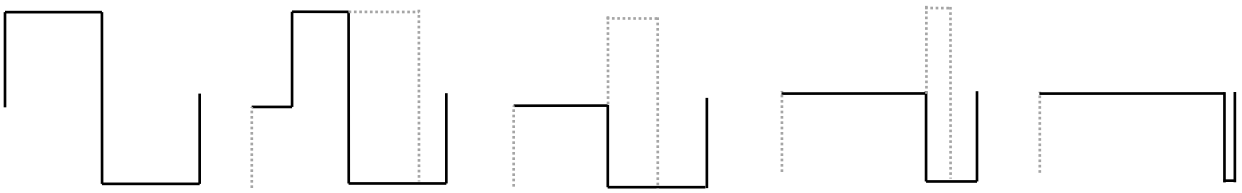
Besides **Shape** value the **pulse width** setting can also change the Square wave independently which results in creating of more complex and unpredictable waveforms with rich harmonics. Don't forget to tweak the shape and pw to find the sweet spots. You can modulate the shape and pw at the same time too.

TriSqr has the same concept while it is built from a **Triangle** and **Square** wave:



Shape 0 *Shape 50* *Shape 100* *Shape 150* *Shape 200*

StpSqr is a kind of square wave with double steps while the Pulse Width parameter only affects one part. However, you can get a virtual PWM on the second part with modulating Shape:



Shape 0 *Shape 50* *Shape 100* *Shape 150* *Shape 200*

Xor1-2: When it is selected, it replaces oscillator 1 output with "**ring modulated"** combination of oscillators 1 and 2 square waves. Varying the frequency of oscillator 1 with respect to oscillator 2 produces a wide range of non-harmonic overtones useful for creating crunchy and gritty sounds.

> ***XOR** ring modulator is a kind of analog ring modulator that only receives square wave as input, the output is square wave and result of the input multiplication. It has been used in many vintage synths like Arp, Korg and etc.*
>
> *XOR function is internally hardwired, after selection it automatically gets a **square** wave from **OSC 2** while other waveforms can be selected on OSC2 at the same time. Except the **OSC 2 Pitch** other settings do not affect the Xor funtion like: waveform, Oscillator level, etc.*

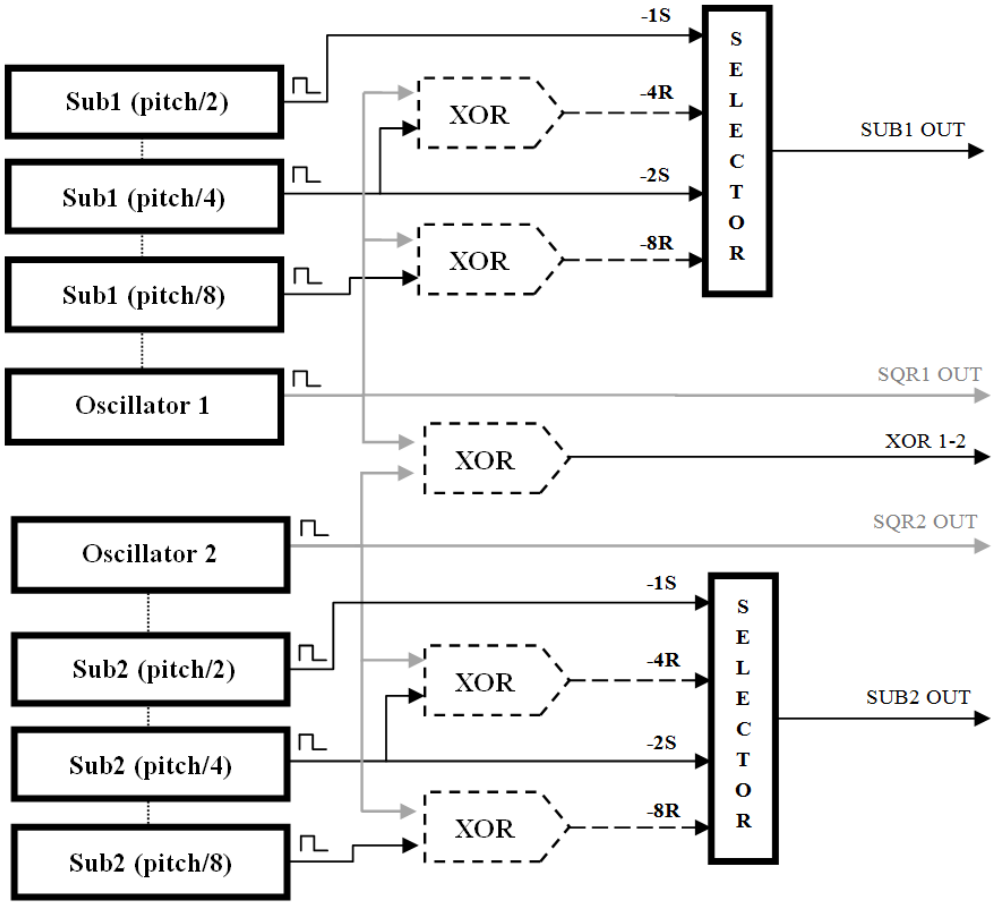
PW: [0…200] determines the amount of Pulse Width for Square waveform.

Shape: [0…200] alters the wave shape for combined waveforms: SawSqr, TriSqr, StpSqr. (Soft Knob E4)

Phase: [0…127] sets the start phase for oscillator. It makes sense when at least two oscillators are used in the patch (Soft Knob E4). See Phase Mode (page 4)

Subtype: [-1 Oct, -2 Oct, -4Ring, -8Ring, Off] each oscillator has a dedicated sub oscillator which can be tuned 1 or 2 octave below the base frequency. Sub oscillator output is a square wave with 50% PW. The sub output can be replaced by ring modulated combination of oscillator 1 and its sub which is tuned 2 or 4 octaves below the base. The ring modulator is XOR based and only accepts square wave, all signal connections are hardwired internally like the following picture.

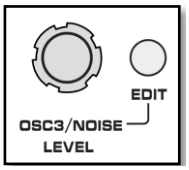
Sub Mode	Description
-1 Oct (-1S)	Sub Oscillator pitch : ½ base freq
-2 Oct (-2S)	Sub Oscillator pitch : ¼ base freq
-4 Ring (-4R)	Xor Ring =X*Y (X=oscillator signal , Y= sub oscillator ¼ base freq)
-8 Ring (-8R)	Xor Ring =X*Y (X=oscillator signal , Y= sub oscillator 1/8 base freq)
Off	Disconnects Signal from the mixer and reduces background noise



OSCILLATOR 2

All parameters of oscillator 2 are the same as oscillator 1. The Xor 1-2 is only available for oscillator 1 and not for oscillator 2 waveform.

OSCILLATOR 3 / NOISE GENERATOR



Oscillator 3 waveform is limited to **Square** wave. Oscillator 3 output and Noise generator share a single VCA, you can only use and select one of them. The noise generator module can produce standard **White**, **Pink**, **Red** and **C64** noise.

Semitone: [-60…+60] sets oscillator 3 and pitched noise base frequency over 10 octaves from C-1 to C9: 8Hz-8Khz (C4 is the middle C) (Soft Knob E2)

Noise Type: [white, Pink, Red, C=64, SQR] determines the noise type or replaces the output with Oscillator 3 signal. (EDIT Button)

Keytrk: [on, off] enables/disables keyboard tracking for the oscillator 3. (Soft Knob E4)

> ***C64 type*** *is a pitched noise which can be played by keyboard. it is like a lo-fi white noise while its harmonics are emphasized by the base frequency of Oscillator 3. This type of noise is inspired from the famous SID chip noise generator section that was found in old Commodore 64 game console. When you modulate the pitch of the oscillator 3 it also affects the C64 noise pitch.*

VOICE

Porta: [0…127] determines the **Portamento/Glide time**. Porta LED=On shows that the portamento time is more than zero.

The portamento time can be **fixed** or **scaled.** In Fixed mode Portamento time is fixed regardless of the distance between two played keys. In Scaled mode it is variable and represents the amount of time it takes to glide a distance of one octave. For example if the distance between the first and the second key is two octaves, the portamento time will be double.

Porta Type: see table.

Porta Type	Description
Legato Fixed	Portamento will occur only if you play a second key before lifting up the first key.
Always Fixed	Portamento always occurs regardless of the situation of the next keys.
Legato Scaled	Portamento will occur only if you play a second key before lifting up the first key.
Always Scaled	Portamento always occurs regardless of the situation of the next keys.

Bend Range: [0…24] Determines how many semitones the incoming **pitch wheel** data can bend the pitch of the oscillators. If you set it to zero, the pitch wheel will have no direct effect on the pitch, although it can still be used in the Mod Matrix as a source of the modulation.

Detune: [0…50] sets the amount of detuning between the three oscillators. The detune function increases oscillator 1 pitch and decreases oscillator 2 pitch from 1 cent to 50 while leaves the oscillator 3 pitch untouched.

FM: [0…1022] sets the amount of FM **depth**, Zero means disable. (Coarse Soft Knob E1, Fine E3)

FM is located in Voice section Page2. [E3] soft knob changes value ±1 step and [E1] changes it ±10 steps.

Oscillator 2 **Triangle** signal always modulates oscillator 1 frequency (you cannot change the modulator waveform here it is hardwired internally). Varying the pitch of oscillator 2 regarding FM depth will result in frequency modulation of oscillator 1. Except the pitch, other settings of oscillator 2 does not affect on FM function. For the best result **Square** should be selected as waveform in oscillator 1.

Drift: [0…127] sets the amount of **Analog Drift.** (Soft Knob E4)

Although the Xenophone's oscillators are analog but the main pitch is controlled by a microprocessor (based on digital tuning word not voltage) which makes the synth always in tune. Analog drift detunes and modulates oscillators in micro-cents range. If you want to hear the effect of analog drift you should use more than one oscillator and set the **[Phase Reset]** parameter to **Free-run**.

> ***Analog drift*** *is an algorithm which emulates the analog circuit components tolerance, temperature effect and power supply noise. These flaws caused instability and tuning issues in old analog synthesizers that used* ***voltage based*** *pitch control system. On the other hand and in a magical way these flaws have a significant role in warmth and fatness of the sound when more than one oscillator is used in the patch.*

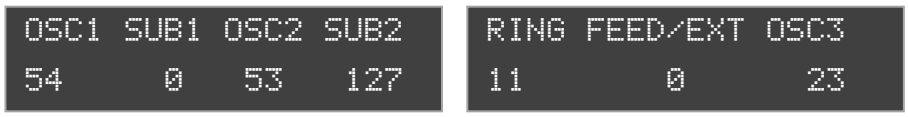
Sync: [Off, On] enables/disables **Hard Sync**. It synchronizes fundamental frequency of oscillator 1 with frequency of oscillator 2, producing a "hard sync" effect. In order for synchronization to occur oscillator 2 must be set to some frequency preferably lower than the frequency of oscillator 1.

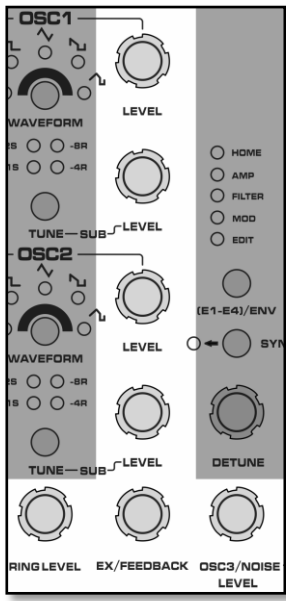
Phase Reset: [On, Free-run] when "on" forces oscillators to start at specific phase (usually zero) every time a new note is played. Each Oscillator has a dedicated phase parameter that represents the starting point in waveform. If OSC1 Phase and OSC2 Phase have the same value, [Phase Reset = On] forces them to be **phase synced**. In some sounds like percussive or bass it helps to increase punch and overall audio level specifically when the waveforms and settings on both oscillators are the same. (Soft Knob E3)

In **Free-run** mode the oscillators are working freely and the **Note-On** message does not reset the phase. In most of the analog synths, oscillators are working in Free-run mode. You can get the best result for creating vintage synth sounds and fat brasses Using Free- run mode + Analog drift at the same time.

MIXER

The Xenophone mixer has seven inputs that are categorized in two pages on the display:





OSC1 Level: [0…127] Determines oscillator 1 level.
SUB1 Level: [0…127] Determines sub oscillator 1 level.
OSC2 Level: [0…127] Determines oscillator 2 level.
SUB2 Level: [0…127] Determines sub oscillator 2 level.

Ring Level: [0…127] Determines analog ring modulator level. Ring modulator gets the oscillator 1 and 2 audio signal as input and multiplies the levels and polarity of these signals. Varying the pitch of oscillator 1 or 2 will generate various non-harmonics overtones at ring modulator output while keeping fundamental frequencies of the inputs. Ring modulator is useful for creating metallic and bell type sounds.

EXT/Feedback: [0…127] Determines "External Audio Level" or "Feedback Amount". You can use only one function regarding the connection of external TRS jack.

For processing external audio with filter and DFX you can inject an external audio signal into the Xenophone input located at the back panel. Note that for hearing the audio the Amp Envelope must be open this means that you must play a note or set the **[Amp Env Release]** to maximum value (Hold). A pre-configured patch for this purpose is located in factory Bank0-Program122: MSC-Ext Audio 1.

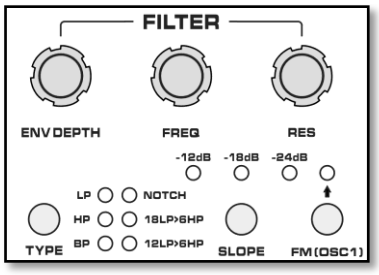
When external jack is disconnected, Xenophone uses its path for injecting post-filter signal into the mixer regarding the feedback level. Increasing feedback adds warmth and overdrive to the sound besides it decreases resonance amount, when filter is set to LP or serial modes. For HP, BP and notch it increases resonance.

Warning: *Using feedback with level higher than 50 may cause self-oscillating with massive level at the output, in order not to harm your ears and speakers use this parameter with care.*

OSC3 Noise Level: [0…127] Determines oscillator 3 or Noise Generator level.

> ***Clipping:*** *Like other analog mixers, Xenophone mixer has the potential to clip the output If the summation of the input signals exceeds a certain level (clipping level). For example if you set OSC1, OSC2, SUB1 and SUB2 levels all to* ***127*** *you should not expect clip-less signal at the output. A good starting point for input levels is* ***64****. If you hear clipping in a patch, the first thing you should do is decreasing the levels of oscillators, subs, ring, ext and noise. Beside the mixer, increasing the* ***Feedback*** *level and* ***high*** *resonance on* ***24db filter*** *can also clip the signal. The solution is only reducing the source levels or resonance amount.*

FILTER [VCF]



ENV Depth: [-50.0…+50.0] sets how much the **filter envelope** modulates filter frequency.

Freq: [0…4095] sets the filter cut off frequency.

Res: [0…100] sets the filter resonance level. The 24dB and serial filters self-oscillate at high resonance level. See table:

Filter Type	Self-Oscillating region	Self-Oscillating Wave
LP/HP -24dB	Res= 96…100	Sinus
18dBLP > 6dBHP	Res= 57…100 (scream)	Triangle
12dBLP > 6dBHP	Res = 57…100 (scream)	Clipped Triangle

The table is valid only when the Feedback level is zero, non-zero feedback level alters the resonance amount.

Keytrk: [-100…+100] sets how much the filter frequency tracks the keyboard. For example, it makes filter frequency higher as you play higher notes on the keyboard or lower as you play lower notes. The keyboard tracking signal is the summation of MIDI note number, portamento and pitchbend signal. A setting of [0] means the keytracking have no effect on the filter frequency. A setting of [+100] means the filter cutoff will follow the keyboard pitch at a 1:1 ratio centered around C4 (MIDI note 60). (Soft Knob E4)

Type: Sets the filter type. see table:

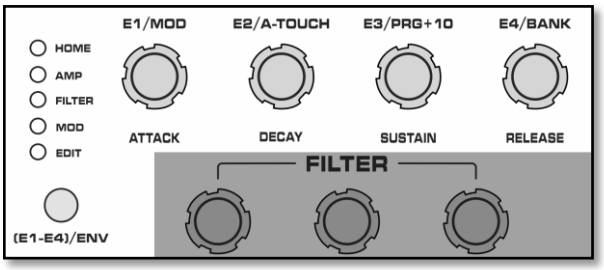
Filter Type	Description	Available Slopes
LP	Low-Pass	-12dB, -18dB, -24dB
HP	High-Pass	-12dB, -18dB, -24dB
BP	Band-Pass	-12dB
Notch	Notch Filter	-12dB
18LP>6HP	Serial LP > HP 1	-24dB
12LP>6HP	Serial LP > HP 2	-18dB

Slope: [-12dB, -18dB, -24dB] sets filter slope. see table above.

FM(OSC1): [Off, On] enables audio rate modulation for filter frequency via oscillator1. When [FM=On] oscillator1 signal will be disconnected from the mixer.

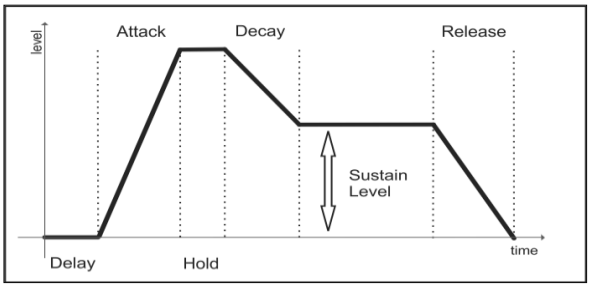
ENVELOPES

Xenophone has 3 envelopes: **Amp**, **Filter** and **Mod**. Amp ENV is connected to the master **VCA** and Filter ENV is connected to the **VCF**. Mod ENV is an auxiliary envelope. All three envelopes are available as mod source in mod-matrix.



Unlike the regular 4 stage ADSR envelopes, here envelopes have 6 stages DAHDSR:
Delay, attack, decay, hold, sustain, release.

The **delay** stage provides adjustable wait time after the envelope trigger, which is useful for creating delayed-vibrato effect.



The **Hold** stage freezes the envelope signal level after the attack stage that can be used for increasing punch in percussive sounds with fast attack and decay. Filter and Mod envelopes have 6 stages, but the Amp envelope has 5 stages (without delay).

How to change envelopes settings?

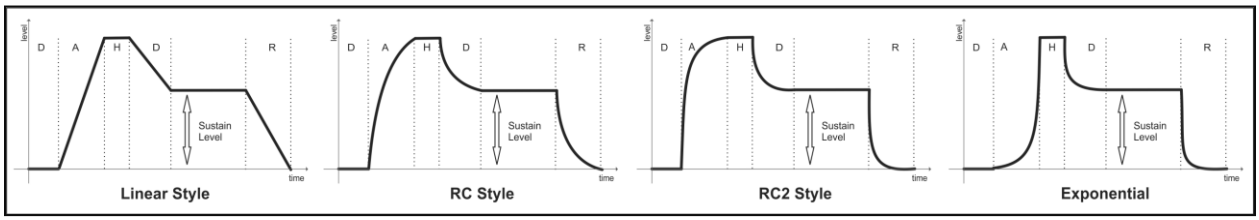
Using **[E1-E4/ENV]** button you can select the envelope edit pages and edit the parameters by soft knobs.

> ***History Feature:*** *Xenophone remembers the* ***last edited envelope*** *and shows it by blinking related LED. Thus you can switch back to the last tweaked envelop only by pressing* ***[ENV]*** *button one time. (For example, imagine the display shows "Mod Env" page when you use* ***[freq]*** *knob to change filter frequency the display will jump to Filter edit-page and the "Mod Env LED" start blinking, showing that you can switch back to* ***Mod Env*** *by pressing* ***ENV*** *button again)*

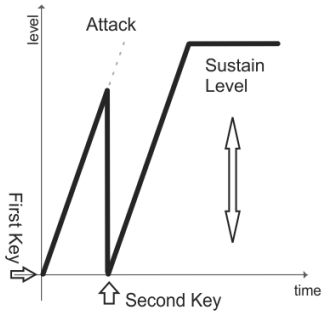
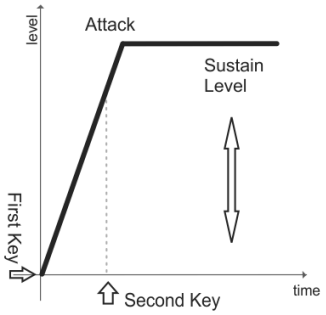
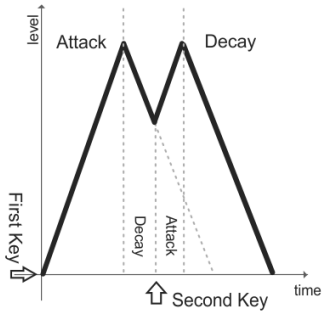
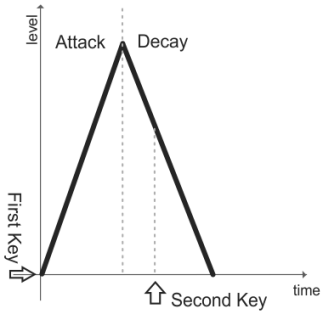
> ***UI-Fixed Mode:*** *As you can only edit envelops with soft-knobs, this feature allows you to edit envelops parameters and other synth parts at the same time without screen jump. It temporarily enables/disables the "Display Mode =* ***Fixed****", while you are tweaking envelops in "Display Mode =* ***Jump****". For enabling UI-Fixed mode, press* ***[enter]*** *button in envelop edit-page, then the screen will be locked to env edit-page while you can change other parameters at the background. For disabling it, press [enter] again.*

Envelope Style: Besides stage timing, the envelope architecture has a significant role in shaping and forming the output signal of the envelope. Xenophone features 4 envelopes styles and you can set different style for each envelope. **Linear** style is what you can found in most of the digital synths that has its own linear character. The **RC** style is based on the vintage envelope design that follows

exponential curve of capacitor charge/discharge voltage. **RC2** is like RC1 with steeper curve and **Exponential** style uses negative slope for attack stage.



Envelope Trigger: Determines where your envelope starts when you play notes:

Trigger Mode	Trigger Mode
Always: Always starts from the beginning of the attack stage.	**Legato:** For the first key it forces the envelope to start from the beginning of the attack stage, For the second key it continues from the current state/level of the envelope.
	
Analog1: Always starts the attack stage from the current level of the envelope without reset to zero level. It makes sense when long decay or release time is used.	**Analog2:** It is the legato version of Analog1.
	
LFO2SH: Forces the envelope to start from the beginning of the attack stage at each clock cycle of LFO2 when S&H is selected as waveform.	
#FootP: Forces the envelope to start from the beginning of the attack stage, only after receiving MIDI Foot Pedal message CC#64.	

AMPLITUDE ENVELOPE (AHDSR)

Attack: [1mS…29.9S] sets attack time for Amp Envelope.
Decay: [1mS…29.9S] sets decay time.
Sustain: [0…100] sets sustain level.
Release: [2mS…29.9S] sets release time.

Velo: [0…127] sets velocity amount. (Soft Knob E1)
Hold: [1mS…29.9S] sets hold time. (Soft Knob E3)
Stl: [Lin, RC, Exp] sets the envelope style. (Soft Knob E1)
Trig: [Always, Legato, Analog1, Analog2] sets the trigger mode. (Soft Knob E3)

loop: when [release = 0] the loop function is enabled this means that the envelope will continuously switch back to the beginning of the attack stage after finishing the decay cycle.

Hold: when [release > 29.0S] it will force the envelope to be opened even without receiving the note-on message. This feature is useful when you want to hear the external audio without playing a key on the keyboard.

FILTER ENVELOPE (DAHDSR)

Attack: [1mS…29.9S] sets attack time for Filter Envelope.
Decay: [1mS…29.9S] sets decay time.
Sustain: [0…100] sets sustain level.
Release: [2mS…29.9S] sets release time.

Delay: [0…127] sets delay time. (Soft Knob E1)
Hold: [1mS…29.9S] sets hold time. (Soft Knob E3)

Stl: [Lin, RC, RC2, Exp] sets the envelope style. (Soft Knob E1)

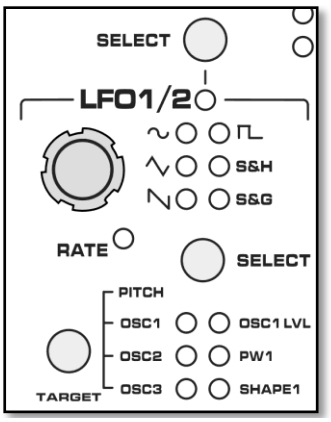
Trig: [Always, Legato, Analog1, LFO2S&H, Analog2, #FootP] sets the trigger mode. (Soft Knob E3)

loop: when [release = 0] the loop function is enabled this means that the envelope will continuously switch back to the beginning of the attack stage after finishing the decay cycle. In this case the envelope can be used as LFO with an unusual waveform.

MOD ENVELOPE (DAHDSR)

MOD envelope parameters are the same as filter envelope.

LFO1

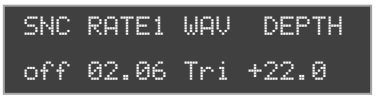


Rate: [0.00…99.90 Hz] sets the LFO frequency.

Sync: [On, Off] when on, The LFO rate can be controlled with note values between 1/2 and 1/32 notes. The rate is then dependent on the tempo setting. (Soft Knob E1)

Waveform: sets the LFO waveform:
[Sinus, Tri, Saw, Sqr, Sample & Hold, Sample & Glide]

Depth: [-100.0…+100.0] sets LFO depth. Depth represents the modulation depth at the same time you can set the LFO with different depth in mod-matrix slot. The depth range covers ± 1 octave when OSC1/2/3 pitch is selected. (Soft Knob E4)



Target: sets the modulation target for LFO1:
[none, Oscillator 1 Pitch, Oscillator 2 Pitch, Oscillator 3 Pitch, Oscillator 1 level, Oscillator 1 PW, Oscillator 1 Shape]
OSC1/2/3 options can be selected at the same time.

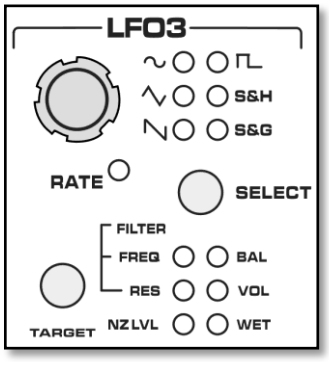
Reset: [Always, Legato, Freerun] sets LFO reset behavior regarding the played notes. **"Always"** forces the LFO waveform to start at zero phase after receiving each note-on message. "**legato"** only resets the LFO signal for the first key. "**Free-run"** never resets LFO. (Soft Knob E4)

LFO2

For quick accessing to LFO2 settings you can use the **[select]** button. LFO2 does not have independent modulation targets, other parameters are the same as LFO1.

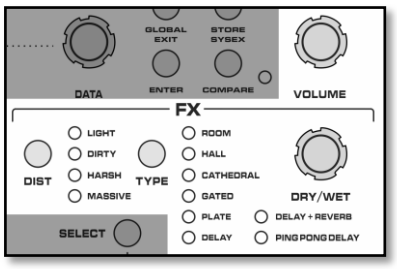
LFO3

All parameters of LFO3 are the same as LFO1, except the mod targets:
[none, Filter Freq, Filter Resonance, Noise Level, Main Balance, Main Volume, DFX Wet Level]



MAIN

DFX type: sets digital FX type. DFX has three parameters: P0, P1, P2. These parameters are different for every algorithm: (Soft Knobs E2-4)

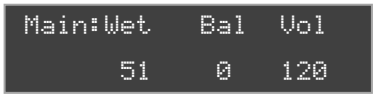


Type	P0 [0…200]	P1 [0…200]	P2 [0…200]
Room	Pre-delay	Reverb Time	Damp
Hall	Pre-delay	Reverb Time	Damp
Cathedral	Pre-delay	Reverb Time	Damp
Gated	Pre-delay	Reverb Time	Damp
Plate	Time	LF Response	HF Response
Delay	Left Delay [0-1000 ms]	Right Delay [0-1000 ms]	
Delay + Reverb	Delay [0-690 ms]	Repeats	Reverb
Ping Pong Delay	Left Delay [0-500 ms]	Right Delay [0-500 ms]	Repeats

Sync: [On, Off] when on, DFX delay time can be controlled with note values between 1/2 and 1/32 notes. The rate is then dependent on the tempo setting. If the selected synced rate for Px is more than the maximum delay length of the algorithm, it will be marked with an exclamation point **"!"** on the screen showing that you must switch to a shorter delay time. (Soft Knob E1)

Distortion: [Light, Dirty, Harsh, Massive] sets the distortion type.

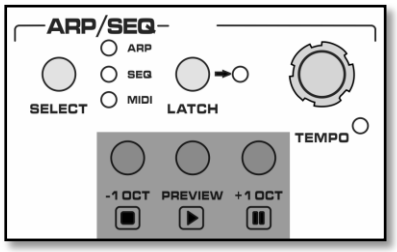
Dry/Wet: [0…127] sets how much the DFX wet (processed) signal is added to the dry (unprocessed) signal. "0" means 0% Wet (no effect).



Balance: [-50…+50] sets the amount of balance between Left and right outputs. (Soft Knob E3)

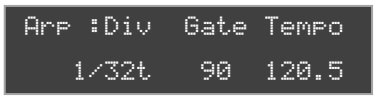
Volume: [0…127] sets the amount of main volume (program level).

ARPEGGIATOR/SEQUENCER



Using The **[Select]** button you can access the arp/seq edit pages. The clock settings are shared between the arpeggiator and sequencer. Arpeggiator and sequencer cannot be used at the same time. The "**Span"** option determines which one of them is active. For both modules, the **"gate"** value defines note length.

Arpeggiator settings:



Div: [1/32 , 1/16 , 1/8 , 1/4 , 1/2 , 1/32d, 1/16d, 1/8d, 1/4d, 1/2d, 1/32t , 1/16t , 1/8t , 1/4t , 1/2t] sets the duration between two notes and thus defines the speed, at which the notes are played. "D" stands for dotted and "T" is for triolic note lengths. (Soft Knob E2)

Gate: [0…127] defines the gate signal duration. Gate represents the length of each note. When the gate is set to 64, the length of each note is half of the time between two successive notes. (Soft Knob E3)

Tempo: [50.0…250.0 bpm] sets the master tempo. Tempo controls arp/seq speed, LFOs synced rates and DFX synced delay. (fine tune: Soft Knob E4)

Span: [Off, Up, Down, Up/Down, Step] when off arp/seq function is off. *Up*, *Down* and *Up/Down* define the arp melodic order. Step activates sequencer and deactivates arpeggiator. (Soft Knob E2)

Range: [1...3 octave] determines over how many octaves the notes are spread. (Soft Knob E3)

Latch: [Off, On] When on, latch LED is lit and notes played on the keyboard will continue to arpeggiate after the keys are released. The latch function also works when arp/seq is off. (latch button)

Sequencer: can be configured to function as 4 x 16 "analog-style" step sequencer or 4x16 "digital style" Step-LFO:

HOLD	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>	>>
NOTE	C5	--	C#5	--	C5	C6	--	C5	C5	C5	C5	C5	C5	C5	C5	C5
VEL	100	0	66	0	122	87	0	100	100	100	100	100	100	100	100	100
AUX1	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
AUX2	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
step	1			4				8				12				16

Each configuration can generate four separate sequence tracks (Note, Velocity, AUX1 and AUX2) at the same time. When configured as “sequencer” the note track controls voice pitch and the velocity track controls velocity regarding the “velocity” option. AUX1 and AUX2 are auxiliary tracks and by default they have no function. All four tracks can be set as a mod source in mod-matrix in order to modulate targets. When configured as “Step-LFO”, the pitch and velocity control are disabled but all tracks can be used in mod-matrix. “Trigger” option defines which mode is active.

Wrap: [1…16] sets the loop point for sequencer. When Wrap is set to 8 for example, the arranged sequence will be restarted every 8 steps. (Soft Knob E2)

Trigger: sets the trigger mode also defines the sequencer or step-LFO mode. (Soft Knob E3)

Trigger Mode	Description
Key-RST	**Sequencer** always starts from the first step for each played note.
No-Reset	**Sequencer** keeps playing notes from the last step, every time a new note is played.
Stp-LFO	Free running **Step-LFO** without reset to first step.
StpLRst	**Step-LFO** always starts from the first step for each played note.

Ktr: [Off, On] enables/disables key tracking option for sequencer. When “on” it transposes the arranged sequence regarding the key you press on your keyboard. When off the pressed key only triggers the arranged sequence without the pitch transpose. (Soft Knob E4)

Velocity: [Step, Key] When set to “Step” the sequencer uses the velocity from the velocity track for each step. When set to “Key” it uses the incoming MIDI note velocity for all steps. (Soft Knob E2)

Sequencer Note Step1…16: [0…127 C0…F#10] sets note number in sequence track 1 (Soft Knob E3, Symbol “-”). For inserting “rest” in step, note number must be set to 127 (Soft Knob E2, Symbol “ ”).

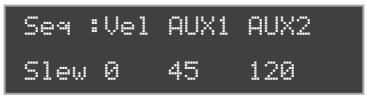
Hold Step1…16: [Off, On] activates the hold function for selected step. When hold is on, the sequencer does not generate gate-off signal for that step. Hold is useful for generating pitch slide while portamento defines the slide time. (Soft Knob E4, Symbol “>”)

Sequencer Velocity Step1…16: [1…127] sets the velocity value in sequencer track 2. (Soft Knob E3)

Sequencer AUX1 Step1…16: [1…127] sets AUX1 value in sequencer track 3. (Soft Knob E3)

Sequencer AUX2 Steps1…16: [1…127] sets AUX2 value in sequencer track 4. (Soft Knob E3)

Velocity Slew rate: [1…127] sets slew rate for velocity track. Slew rate function works like a "lag processor" which limits the rate at which a signal can increase or decrease in value. (Soft Knob E2)



AUX1 Slew rate: [1…127] sets slew rate for AUX1 track. (Soft Knob E3)

AUX2 Slew rate: [1…127] sets slew rate for AUX2 track. (Soft Knob E4)

How to build a sequence manually?

1. Press arp/seq **[select]** button and make sure "span" option is set to "step", wrap option is set to a number more than 1, and trigger is set to Key-RST.

2. Press arp/seq **[select]** button again until the "step edit" page is displayed:

3. Use **[E1]** knob to select the steps then enter/change notes with **[E3]**.

4. Press **[preview]** button or any key on your keyboard to hear the arranged sequence.

How to record a sequence via MIDI?

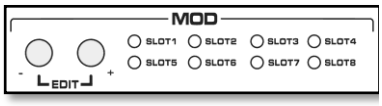
1. Press arp/seq **[select]** button until the "step edit" page is displayed, then press **[Enter]** button. The xeno will write *PRESS* on the right corner of the screen, jump to the first step and the seq LED blink:

2. Play notes on your external keyboard, the sequencer automatically jumps to the next step after you play a note until it reaches the wrap point.

3. Press arp/seq **[select]** button to stop recording

4. Press **[preview]** button or any key on your keyboard to hear the arranged sequence.

MODULATION MATRIX



Xenophone features 8 slots modulation matrix. Every slot has a dedicated **LED,** which shows that the modulation is active or not. If the depth is set to zero or "none" is selected as source or target, the slot LED will turn off showing that there is no modulation on that path. Using **[+/-]** buttons you can select the different slots.

Source 1…8: [] sets modulation source (see source table). (Soft Knob E1)

Target 1…8: [] sets modulation target (see target table). (Soft Knob E3)

Depth 1…8: [] sets modulation depth. (Coarse Soft Knob E2, Fine E4)

All sources, whether it is MIDI data or hardware modulator, are converted to the same range. The range covers [0…+1] for unipolar and [-1…+1] for bipolar sources. Unipolar means that the source is only increasing (or if applied with negative depth, decreasing) the target's value. Bipolar means that the source can increase or decrease the target's value.

Source Table

Source Name	Description	Signal Polarity
none	No source.	--
LFO1	Current value of the LFO1.	bipolar
LFO2	Current value of the LFO2.	bipolar
LFO3	Current value of the LFO3.	bipolar
Amp Env	Current value of the Amplitude envelope.	unipolar
Flt Env	Current value of the Filter envelope.	unipolar
Mod Env	Current value of the Mod envelope.	unipolar
keytrkU	MIDI Note number (0-127).	unipolar
keytrkB	MIDI Note number that uses C4 (MIDI note 60) as the center. Higher keys than the center key transmit positive values, lower keys negative values.	bipolar
KeyFllw	It is like KeytrkB but it truly tracks the voice pitch including portamento and pitchbend signal.	bipolar
Velocit	MIDI Note-On velocity information.	unipolar
P-Wheel	MIDI Pitch wheel data.	bipolar
M-Wheel	MIDI modulation wheel data (CC#01) or [E1] knob on homepage.	unipolar
A-Touch	MIDI aftertouch/channel pressure data or [E2] knob on homepage.	unipolar
#Breath	MIDI Breath controller (CC#2).	unipolar
#Foot	MIDI Foot controller (CC#4).	unipolar
#Exp	MIDI Expression Pedal controller (CC#11).	unipolar
#Pedal	MIDI Sustain Pedal controller (CC#64).	unipolar
Rand-U	A random unipolar source.	unipolar
Rand-B	A random bipolar source.	bipolar
RandKey	A random bipolar value that will be generated after pressing a key.	bipolar
Altrnat	Sends a constant value of 1 after pressing the first key and -1 after pressing the second key.	bipolar
Constnt	Sends a constant value of 1. This can be useful for offsetting a certain parameter.	unipolar
CV-In	Current value of the CV in voltage. (CV connector must be configured as input in global menu)	bipolar
EXT-Lvl	Current level of external input signal. (An audio source must be connected to external input)	unipolar
LFO1*MW	LFO1 multiplied by Mod Wheel data. (Useful for creating variable depth vibrato)	bipolar
LFO2*MW	LFO2 multiplied by Mod Wheel data.	bipolar

Source Name	Description	Signal Polarity
LFO3*MW	LFO3 multiplied by Mod Wheel data.	bipolar
LFO1*AT	LFO1 multiplied by Aftertouch data. (Useful for creating variable depth vibrato)	bipolar
LFO2*AT	LFO2 multiplied by Aftertouch data.	bipolar
LFO3*AT	LFO3 multiplied by Aftertouch data.	bipolar
LFO1*E3	LFO1 multiplied by Modulation Envelope (ENV3).	bipolar
LFO2*E3	LFO2 multiplied by Modulation Envelope (ENV3).	bipolar
LFO3*E3	LFO3 multiplied by Modulation Envelope (ENV3).	bipolar
LFO1*2	LFO1 multiplied by LFO2.	bipolar
LFO1*3	LFO1 multiplied by LFO3.	bipolar
SEQ-T1	Current value of sequencer track1 (note).	unipolar
SEQ-T2	Current value of sequencer track2 (velocity).	unipolar
SEQ-T3	Current value of sequencer track3 (AUX1).	unipolar
SEQ-T4	Current value of sequencer track4 (AUX2).	unipolar
ATouchP	MIDI Polyphonic aftertouch data.	unipolar

Target Table

Target Name	Description	Target Name	Description
None	No source.	**Master Bal**	
OSC1 Pitch	The tuning of oscillator 1 in semitones (+12…-12). A mod depth value of +100% transposes the oscillator one octave up, -100% transposes one octave down.	**DFX Wet**	--
OSC2 Pitch	See OSC1 Pitch description	**LFO1 Rate**	--
OSC3 Pitch	See OSC1 Pitch description	**LFO2 Rate**	--
OSC1+2 Pitch	Oscillator 1 and 2 pitch	**LFO3 Rate**	--
Main Pitch	Oscillator 1, 2 and 3 pitch	**LFO1 Depth**	--
OSC1 PitchW	The tuning of oscillator 1 in octave (+10…-10). A mod depth value of +100% transposes the oscillator 10 octaves up, -100% transposes 10 octaves down. (Wide Pitch)	**LFO3 Depth**	--
OSC2 PitchW	See OSC1 PitchW description	**Amp Env A**	Amp Envelope Attack
OSC3 PitchW	See OSC1 PitchW description	**Amp Env H**	Amp Envelope Hold
OSC1+2 PtchW	Oscillator 1 and 2 wide pitch	**Amp Env D**	Amp Envelope Decay
Main PitchW	Oscillator 1, 2 and 3 wide pitch	**Amp Env R**	Amp Envelope Release
OSC1 Level	Oscillator 1 level	**Flt Env A**	Filter Envelope Attack
OSC2 Level	Oscillator 2 level	**Flt Env H**	Filter Envelope Hold
Sub1 Level	Sub Oscillator 1 level	**Flt Env D**	Filter Envelope Decay
Sub2 Level	Sub Oscillator 2 level	**Flt Env R**	Filter Envelope Release
OSC3/N Level	Oscillator 3 or Noise generator level	**Mod Env A**	Mod Envelope Attack
Ring Level	Ring Modulator level	**Mod Env H**	Mod Envelope Hold
EXT Level	External Input or Feedback level	**Mod Env D**	Mod Envelope Decay
OSC1 PW	Oscillator 1 Pulse Width	**Mod Env R**	Mod Envelope Release
OSC1 Shp	Oscillator 1 Shape	**Matrix Dpth1**	The depth of slot1
OSC2 PW	Oscillator 2 Pulse Width	**Matrix Dpth2**	The depth of slot2
OSC2 Shp	Oscillator 2 Shape	**Matrix Dpth3**	The depth of slot3
Fm Depth	--	**Matrix Dpth4**	The depth of slot4
Porta Time	--	**DFX P0**	--
Filter Freq	--	**DFX P1**	--
Flter Res	--	**DFX P2**	--
Flt Env Dpth	--	**CV-OUT**	CV output level
Master Level	--		

APPENDIX A

MIDI Implementation Chart

Function		Transmitted	Recognized	Remarks
Basic Channel	Default	1	1	
	Changed	1-16	1-16	User selectable
Mode	Default	MODE 3	MODE 4*	
	Changed	X	X	
Note number	Sound range	0-127	0-127	
Velocity	Note On	O 0-127	O 1-127	
	Note Off	X	X	
Aftertouch	Keys	X	O	
	Channels	O*	O	*[E2] Knob
Pitchbend		X	O	
Control Change		O	O	
Program Change	Actual No.	O 0-127	O 0-127	Displayed 1-128
System Exclusive		O	O	
NRPNs		O	O	
RPNs		X	X	
System Common	Song Position	X	X	
	Song Select	X	X	
	Tune Request	X	X	
System Real Time	Clock	O	O	
	Commands	X	X	
Aux Messages	Local On/Off	X	X	
	All Notes Off	X	O	
	Act. Sensing	X	X	
	Reset	X	X	

O = implemented
X = not supported

Modes: Mode 1 - Omni On, Poly
Mode 2 - Omni On, Mono
Mode 3 - Omni Off, Poly
Mode 4 - Omni Off, Mono

APPENDIX B

MIDI CC/NRPN Table

Parameter	CC	NRPN	Range	Description
OSC 1-Semitone	3		0-120	center=60
OSC 1-Cent	5		0-100	center=50
OSC 1-Keytrck	13		0-1	off=1, on=0
OSC 1-Waveform	9		0-7	
OSC 1-PW		0	0-200	Duty cycle 50% = 100
OSC 1-Shape		1	0-200	
OSC 1-Phase	10		0-127	
OSC 1-Sub Type	12		0-4	
OSC 2-Semitone	14		0-120	center=60
OSC 2-Cent	15		0-100	center=50

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Parameter	CC	NRPN	Range	Description
DFX-P1		12	0-200	
DFX-P2		13	0-200	
DFX-P0_Synced	46		0-14	
DFX-P1_Synced	47		0-14	
DFX-Wet	44		0-127	
Master-Balance	8		0-126	center=64
Master-Volume	7		0-127	
ARP-Tempo		42	500-2500	50.0…250.0 bpm
ARP-Clock Divider	90		0-14	
ARP-Gate	94		0-127	
ARP-Span	91		0-4	
ARP-Range	92		0-2	
ARP-Latch	93		0-127	off=0..63, on=64…127
SEQ-Wrap	102		0-15	
SEQ-Keytrk	103		0-1	off=0, on=1
SEQ-Trigger	104		0-3	
SEQ-Velocity	105		0-1	step=0, key=1
SEQ-Vel Slew	106		0-127	
SEQ-AUX1 Slew	107		0-127	
SEQ-AUX2 Slew	108		0-127	
SEQ-Note Step1		43	0-127	Rest=127
SEQ-Note Step2		44	0-127	Rest=127
SEQ-Note Step3		45	0-127	Rest=127
SEQ-Note Step4		46	0-127	Rest=127
SEQ-Note Step5		47	0-127	Rest=127
SEQ-Note Step6		48	0-127	Rest=127
SEQ-Note Step7		49	0-127	Rest=127
SEQ-Note Step8		50	0-127	Rest=127
SEQ-Note Step9		51	0-127	Rest=127
SEQ-Note Step10		52	0-127	Rest=127
SEQ-Note Step11		53	0-127	Rest=127
SEQ-Note Step12		54	0-127	Rest=127
SEQ-Note Step13		55	0-127	Rest=127
SEQ-Note Step14		56	0-127	Rest=127
SEQ-Note Step15		57	0-127	Rest=127
SEQ-Note Step16		58	0-127	Rest=127
SEQ-Velocity Step1		59	0-127	
SEQ-Velocity Step2		60	0-127	
SEQ-Velocity Step3		61	0-127	
SEQ-Velocity Step4		62	0-127	
SEQ-Velocity Step5		63	0-127	
SEQ-Velocity Step6		64	0-127	
SEQ-Velocity Step7		65	0-127	
SEQ-Velocity Step8		66	0-127	
SEQ-Velocity Step9		67	0-127	
SEQ-Velocity Step10		68	0-127	
SEQ-Velocity Step11		69	0-127	
SEQ-Velocity Step12		70	0-127	
SEQ-Velocity Step13		71	0-127	
SEQ-Velocity Step14		72	0-127	
SEQ-Velocity Step15		73	0-127	

Parameter	CC	NRPN	Range	Description
SEQ-Velocity Step16		74	0-127	
SEQ-AUX1 Step1		75	0-127	
SEQ-AUX1 Step2		76	0-127	
SEQ-AUX1 Step3		77	0-127	
SEQ-AUX1 Step4		78	0-127	
SEQ-AUX1 Step5		79	0-127	
SEQ-AUX1 Step6		80	0-127	
SEQ-AUX1 Step7		81	0-127	
SEQ-AUX1 Step8		82	0-127	
SEQ-AUX1 Step9		83	0-127	
SEQ-AUX1 Step10		84	0-127	
SEQ-AUX1 Step11		85	0-127	
SEQ-AUX1 Step12		86	0-127	
SEQ-AUX1 Step13		87	0-127	
SEQ-AUX1 Step14		88	0-127	
SEQ-AUX1 Step15		89	0-127	
SEQ-AUX1 Step16		90	0-127	
SEQ-AUX2 Step1		91	0-127	
SEQ-AUX2 Step2		92	0-127	
SEQ-AUX2 Step3		93	0-127	
SEQ-AUX2 Step4		94	0-127	
SEQ-AUX2 Step5		95	0-127	
SEQ-AUX2 Step6		96	0-127	
SEQ-AUX2 Step7		97	0-127	
SEQ-AUX2 Step8		98	0-127	
SEQ-AUX2 Step9		99	0-127	
SEQ-AUX2 Step10		100	0-127	
SEQ-AUX2 Step11		101	0-127	
SEQ-AUX2 Step12		102	0-127	
SEQ-AUX2 Step13		103	0-127	
SEQ-AUX2 Step14		104	0-127	
SEQ-AUX2 Step15		105	0-127	
SEQ-AUX2 Step16		106	0-127	
SEQ-HOLD Step1		107	0-1	off=0, on=1
SEQ-HOLD Step2		108	0-1	off=0, on=1
SEQ-HOLD Step3		109	0-1	off=0, on=1
SEQ-HOLD Step4		110	0-1	off=0, on=1
SEQ-HOLD Step5		111	0-1	off=0, on=1
SEQ-HOLD Step6		112	0-1	off=0, on=1
SEQ-HOLD Step7		113	0-1	off=0, on=1
SEQ-HOLD Step8		114	0-1	off=0, on=1
SEQ-HOLD Step9		115	0-1	off=0, on=1
SEQ-HOLD Step10		116	0-1	off=0, on=1
SEQ-HOLD Step11		117	0-1	off=0, on=1
SEQ-HOLD Step12		118	0-1	off=0, on=1
SEQ-HOLD Step13		119	0-1	off=0, on=1
SEQ-HOLD Step14		120	0-1	off=0, on=1
SEQ-HOLD Step15		121	0-1	off=0, on=1
SEQ-HOLD Step16		122	0-1	off=0, on=1

APPENDIX C

Specifications

TYPE: Programmable Subtractive Analog Synthesizer

POLYPHONY: Monophonic

PROGRAM MEMORY: 896 Preset Programs, 7 banks, 128 Patches per bank

SOUND ENGINE: 3 oscillators, 1 multi-mode filter, 1 analog ring modulator, 3 envelope generators, 3 LFOs, Arpeggiator, 4x16 Sequencer and modulation matrix.

EFFECTS: Analog distortion, 24-bit Stereo Digital FX

FILTER FREQUENCY RESPONSE: 20-22K Hz

AUDIO OUTPUTS: 2x 1/4" TRS jacks (Impedance Balanced), Stereo L/R
MAXIMUM OUTPUT LEVEL: +17dBV (6.17 VRMS)
OUTPUT IMPEDANCE: 100 Ohm

AUDIO INPUT: 1x 1/4" TRS jack (Unbalanced)
MAXIMUM INPUT LEVEL: -5.5dBV (0.53 VRMS)
INPUT IMPEDANCE: 75k Ohm

HEADPHONE OUT: 1x 1/4" TRS stereo jack

CV/GATE INPUT/OUTPUT: 1x 1/4" TRS jack
CV/GATE OUT RANGE: CV=0…+10v DC, Gate=0/5v DC
CV/GATE IN RANGE: CV=-5…+5v DC, Gate=0…12v DC
MIDI CONNECTIONS: MIDI In, MIDI Out
USB PORT: 1x Type B

OPERATING SYSTEM: Flash Upgradeable Via USB
REAL-TIME CONTROLLERS: 26 endless encoders, 27 Buttons
POWER CONSUMPTION: 10 Watts max (12v DC)
DIMENSIONS (WXHXD): 12.9" L x 1.9" W x 6.5" H (32.8 cm x 5 cm x 16.7 cm)
WEIGHT: 2.8 lb (1.3 kg)

Specifications are subject to change without notice.

If you encounter any problems, or you have suggestions for future revisions, don't hesitate to contact our technical support at: Support@hypersynth.com

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